

Operational Concept Evaluation of Solid Oxide Fuel Cells for Space Vehicle Applications

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With the end of the Space Shuttle Program, NASA is evaluating many different technologies to support future missions. Green propellants, like liquid methane and liquid oxygen, have potential advantages for some applications. A Lander propelled with LOX/methane engines is one such application. When the total vehicle design and infrastructure are considered, the advantages of the integration of propulsion, heat rejection, life support and power generation become attractive for further evaluation. Scavenged residual propellants from the propulsion tanks could be used to generate needed electric power, heat and water with a Solid Oxide Fuel Cell(SOFC). In-Situ Resource Utilization(ISRU) technologies may also generate quantities of green propellants to refill these tanks and/or supply these fuel cells. Technology demonstration projects such as the Morpheus Lander are currently underway to evaluate the practicality of such designs and operational concepts. Tethered tests are currently in progress on this “vertical test bed” to evaluate the propulsion and avionics systems. Evaluation of the SOFC seeks to determine the feasibility of using these green propellants to supply power and identify the limits to the integration of this technology into a space vehicle prototype.

Poster will contain notional Lander design concepts, Morpheus test photos, SOFC test data completed and planned goals for the future.

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